

1/12

<210> 3
 <211> 1374
 <212> DNA
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 <223> *lsa-nrc*^{Hmut}
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tcctacgaga	agactaaaaa	caacgaaaac	aacaaattct	160
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cgtatcccag	accaacttta	aatccctcct	gcgcaacctc	240
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acaaggaagg	caaactgatt	gaacatatca	tcaacgacga	320
cgatgacaaa	aaaaaataca	ttaaaggcca	ggatgaaaat	360
cgccaggaag	acctcgaaga	aaaagctgct	gaacagcagt	400
cggacctgga	acaggagcgc	ctcgctaaag	aaaagctcca	440
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aacgcataaa	ggaacacggc	gacgttctgg	ctgaggacct	560
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tcgaagaaaa	gaaagacggc	tccatcaaac	cagaacagaa	800
agaagacaaa	agcgctgata	tccagaacca	caccctggag	840
accgtgaaca	ttagcgacgt	gaacgacttc	cagatcagca	880
agtacgagga	cgaaatctcc	gctgaatacg	atgactccct	920
gatcgacgaa	gaagaagacg	acgaagatct	ggatgaattc	960
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aaacgaaaaa	ctggacgacc	tggacgaagg	catcgaaaaa	1080
tcctccgaag	aactgagcga	agaaaaaatc	aaaaaaggca	1120
agaaatacga	aaaaaccaag	gacaacaact	tcaaaccaaa	1160
cgacaaaatc	ctctacgacg	agcacattaa	aaaatacaaa	1200
aacgacaaag	aagtgaacaa	ggaaaaggaa	aaatttatca	1240
aatccctctt	ccacatcttc	gatggcgata	acgaaattct	1280
gcaaattgta	gacgaacggt	tgagcgaaga	catcactaaa	1320
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Asn	Ser	Arg	Asn	Arg	Ile	Asn	Glu	Glu	Lys	
				25						30
His	Glu	Lys	Lys	His	Val	Leu	Ser	His	Asn	
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Ser	Tyr	Glu	Lys	Thr	Lys	Asn	Asn	Glu	Asn	
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Asn	Lys	Phe	Phe	Asp	Lys	Asp	Lys	Glu	Leu	
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Thr	Met	Ser	Asn	Val	Lys	Asn	Val	Ser	Gln	
				65						70
Thr	Asn	Phe	Lys	Ser	Leu	Leu	Arg	Asn	Leu	
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Gly	Val	Ser	Glu	Asn	Ile	Phe	Leu	Lys	Glu	
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Asn	Lys	Leu	Asn	Lys	Glu	Gly	Lys	Leu	Ile	
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Glu	His	Ile	Ile	Asn	Asp	Asp	Asp	Asp	Lys	
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Lys	Lys	Tyr	Ile	Lys	Gly	Gln	Asp	Glu	Asn	
				115						120
Arg	Gln	Glu	Asp	Leu	Glu	Glu	Lys	Ala	Ala	
				125						130
Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	
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Leu	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Arg	Leu	
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Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Arg	
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Asp	Leu	Glu	Gln	Arg	Lys	Ala	Asp	Thr	Lys	
				165						170
Lys	Asn	Leu	Glu	Arg	Lys	Lys	Glu	His	Gly	
				175						180
Asp	Val	Leu	Ala	Glu	Asp	Leu	Tyr	Gly	Arg	
				185						190
Leu	Glu	Ile	Pro	Ala	Ile	Glu	Leu	Pro	Ser	
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Glu	Asn	Glu	Arg	Gly	Tyr	Tyr	Ile	Pro	His	
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Gln	Ser	Ser	Leu	Pro	Gln	Asp	Asn	Arg	Gly	
				215						220
Asn	Ser	Arg	Asp	Ser	Lys	Glu	Ile	Ser	Ile	
				225						230
Ile	Glu	Lys	Thr	Asn	Arg	Glu	Ser	Ile	Thr	
				235						240
Thr	Asn	Val	Glu	Gly	Arg	Arg	Asp	Ile	His	
				245						250
Lys	Gly	His	Leu	Glu	Glu	Lys	Lys	Asp	Gly	
				255						260
Ser	Ile	Lys	Pro	Glu	Gln	Lys	Glu	Asp	Lys	

	265		270
Ser Ala Asp Ile	Gln Asn His Thr Leu Glu		
	275		280
Thr Val Asn Ile	Ser Asp Val Asn Asp Phe		
	285		290
Gln Ile Ser Lys	Tyr Glu Asp Glu Ile Ser		
	295		300
Ala Glu Tyr Asp	Asp Ser Leu Ile Asp Glu		
	305		310
Glu Glu Asp Asp	Glu Asp Leu Asp Glu Phe		
	315		320
Lys Pro Ile Val	Gln Tyr Asp Asn Phe Gln		
	325		330
Asp Glu Glu Asn	Ile Gly Ile Tyr Lys Glu		
	335		340
Leu Glu Asp Leu	Ile Glu Lys Asn Glu Asn		
	345		350
Leu Asp Asp Leu	Asp Glu Gly Ile Glu Lys		
	355		360
Ser Ser Glu Glu	Leu Ser Glu Glu Lys Ile		
	365		370
Lys Lys Gly Lys	Lys Tyr Glu Lys Thr Lys		
	375		380
Asp Asn Asn Phe	Lys Pro Asn Asp Lys Ser		
	385		390
Leu Tyr Asp Glu	His Ile Lys Lys Tyr Lys		
	395		400
Asn Asp Lys Gln	Val Asn Lys Glu Lys Glu		
	405		410
Lys Phe Ile Lys	Ser Leu Phe His Ile Phe		
	415		420
Asp Gly Asp Asn	Glu Ile Leu Gln Ile Val		
	425		430
Asp Glu Arg Leu	Ser Glu Asp Ile Thr Lys		
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Tyr Phe Met Lys	Leu Gly Gly Ser Gly Ser		
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Pro His His His	His His His		
	455		

<210> 5

<211> 17

<212> PRT

<213> Artificial sequence

<220>

<223> Consensus sequence of 17 amino acid repeats where x_1 is either Glu or Gly; x_2 is Ser or Arg; x_3 is Asp or Ser; x_4 is Glu or Asp; x_5 is Leu or Arg; x_6 is Lys or Asn and x_7 is Lys or Thr or Arg.

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X_1 Gln Gln X_2 Asp X_3 Glu Gln X_4 Arg

5

10

X₅ Ala X₆ Glu X₇ Leu Gln
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<212> PRT

<213> *P. falciparum* LSA-1

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<223> *P. falciparum* LSA-1 T1 epitope

<400> 6

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10

Gln Thr Asn Phe Lys Ser Leu Leu Arg Asn

15

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Leu Gly Val Ser

<210> 7

<211> 17

<212> PRT

<213> *P. falciparum* LSA-1

<220>

<223> *P. falciparum* LSA-1 LSA-Rep epitope

<400> 7

Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg

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10

Leu Ala Lys Glu Lys Leu Gln

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<210> 8

<211> 17

<212> PRT

<213> *P. falciparum* LSA-1

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<223> *P. falciparum* LSA-1 J epitope

<400> 8

Glu Arg Leu Ala Lys Glu Lys Leu Gln Glu

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10

Gln Gln Arg Asp Leu Glu Gln

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<210> 9

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<212> PRT

<213> *P. falciparum* LSA-1

<220>

<223> *P. falciparum* LSA-1 NR epitope

<400> 9

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His Gly Asp Val Leu Ala Glu Asp Leu Tyr

15

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 Lys Gly His Leu

<210> 11
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 <213> *P. falciparum* LSA-1
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 <223> *P. falciparum* LSA-1 T3 epitope
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 Glu Lys Ile

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 <223> *P. falciparum* LSA-1 LSA1.4 epitope
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 <223> *P. falciparum* LSA-1 LSA1.1 epitope
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<210> 23

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 <223> *P. falciparum* LSA-1 Doolan 1671 epitope
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<210> 24
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 <213> *P. falciparum* LSA-1
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 <223> Amino acid sequence of LSA-NRC(H) repeat sequence
 between N & C terminals
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 15 20
 Ala Lys Glu Lys Leu Gln Glu Gln Gln Arg
 25 30
 Asp Leu Glu Gln

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 <400> 25

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cgtatcccag	accaacttta	aatccctcct	gcgcaacctc	240
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acaaggaagg	caaactgatt	gaacatatca	tcaacgacga	320
cgatgacaaa	aaaaaataca	ttaaaggcca	ggatgaaaat	360
cgccaggaag	acctcgaaga	aaaagctgct	gaacagcagt	400
cggacctgga	acaggagcgc	ctcgctaaag	aaaagctcca	440
ggagcgcctc	gctaaagaaa	agctccagga	gcaacagcgc	480
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aacgcaaaaa	ggaacacggc	gacgttctgg	ctgaggacct	560
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tgccacaaga	taatcgcggg	aactcccgcg	acagtaagga	680
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tcgaagaaaa	gaaagacggc	tccatcaaac	cagaacagaa	800

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agaagacaaa agcgctgata tccagaacca caccctggag 840
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<210> 26
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Asn Ser Arg Asn Arg Ile Asn Glu Glu Lys
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His Glu Lys Lys His Val Leu Ser His Asn
      35                      40
Ser Tyr Glu Lys Thr Lys Asn Asn Glu Asn
      45                      50
Asn Lys Phe Phe Asp Lys Asp Lys Glu Leu
      55                      60
Thr Met Ser Asn Val Lys Asn Val Ser Gln
      65                      70
Thr Asn Phe Lys Ser Leu Leu Arg Asn Leu
      75                      80
Gly Val Ser Glu Asn Ile Phe Leu Lys Glu
      85                      90
Asn Lys Leu Asn Lys Glu Gly Lys Leu Ile
      95                      100
Glu His Ile Ile Asn Asp Asp Asp Asp Lys
      105                     110
Lys Lys Tyr Ile Lys Gly Gln Asp Glu Asn
      115                     120
Arg Gln Glu Asp Leu Glu Glu Lys Ala Ala
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Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg
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Leu Ala Lys Glu Lys Leu Gln Glu Arg Leu

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Lys	Asn	Leu	Glu	Arg	Lys	Lys	Glu	His	Gly
				175					180
Asp	Val	Leu	Ala	Glu	Asp	Leu	Tyr	Gly	Arg
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Leu	Glu	Ile	Pro	Ala	Ile	Glu	Leu	Pro	Ser
				195					200
Glu	Asn	Glu	Arg	Gly	Tyr	Tyr	Ile	Pro	His
				205					210
Gln	Ser	Ser	Leu	Pro	Gln	Asp	Asn	Arg	Gly
				215					220
Asn	Ser	Arg	Asp	Ser	Lys	Glu	Ile	Ser	Ile
				225					230
Ile	Glu	Lys	Thr	Asn	Arg	Glu	Ser	Ile	Thr
				235					240
Thr	Asn	Val	Glu	Gly	Arg	Arg	Asp	Ile	His
				245					250
Lys	Gly	His	Leu	Glu	Glu	Lys	Lys	Asp	Gly
				255					260
Ser	Ile	Lys	Pro	Glu	Gln	Lys	Glu	Asp	Lys
				265					270
Ser	Ala	Asp	Ile	Gln	Asn	His	Thr	Leu	Glu
				275					280
Thr	Val	Asn	Ile	Ser	Asp	Val	Asn	Asp	Phe
				285					290
Gln	Ile	Ser	Lys	Tyr	Glu	Asp	Glu	Ile	Ser
				295					300
Ala	Glu	Tyr	Asp	Asp	Ser	Leu	Ile	Asp	Glu
				305					310
Glu	Glu	Asp	Asp	Glu	Asp	Leu	Asp	Glu	Phe
				315					320
Lys	Pro	Ile	Val	Gln	Tyr	Asp	Asn	Phe	Gln
				325					330
Asp	Glu	Glu	Asn	Ile	Gly	Ile	Tyr	Lys	Glu
				335					340
Leu	Glu	Asp	Leu	Ile	Glu	Lys	Asn	Glu	Asn
				345					350
Leu	Asp	Asp	Leu	Asp	Glu	Gly	Ile	Glu	Lys
				355					360
Ser	Ser	Glu	Glu	Leu	Ser	Glu	Glu	Lys	Ile
				365					370
Lys	Lys	Gly	Lys	Lys	Tyr	Glu	Lys	Thr	Lys
				375					380
Asp	Asn	Asn	Phe	Lys	Pro	Asn	Asp	Lys	Ser
				385					390
Leu	Tyr	Asp	Glu	His	Ile	Lys	Lys	Tyr	Lys
				395					400
Asn	Asp	Lys	Gln	Val	Asn	Lys	Glu	Lys	Glu
				405					410
Lys	Phe	Ile	Lys	Ser	Leu	Phe	His	Ile	Phe

				415						420
Asp	Gly	Asp	Asn	Glu	Ile	Leu	Gln	Ile	Val	
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Asp	Glu	Leu	Ser	Glu	Asp	Ile	Thr	Lys	Tyr	
				435						440
Phe	Met	Lys	Leu	Gly	Gly	Ser	Gly	Ser	Pro	
				445						450
His	His	His	His	His	His					
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<210> 27
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<213> Artificial sequence
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